

Material Safety Data for: Formic Acid

1. PRODUCT IDENTIFICATION

Name	methanoic acid
Synonyms	formic acid
CAS#	64-18-6
Product Uses	silage additive, leather tanning, acidulant in dyeing, rubber manufacture, etc.

2. INGREDIENTS

	%	TWAEV / TLV mg/m ³	LD ₅₀ ORAL	(mg/kg) SKIN	LC ₅₀ ppm INHALATION
Methanoic Acid	100%	5 / 9	400	not known	825

3. (a) HAZARDS SUMMARY

Hazards, Quick Guide: combustible liquid, heavy vapour travels, distant ignition & flashback possible; corrosive to skin & eyes

Canada – WHMIS

Key:

B 3, E

B 2 – Flash Point <38°C, **B 3** – Flash Point >38°C & <93°C

D 1 – Immediately Toxic, **D 2** – Chronic Toxicity

C – Oxidising Substance, **E** – Corrosive

U.S.A. – HMIS

Key:

Health – 3, Fire – 2, Reactivity – 2

0=minimal, 1=slight, 2=moderate, 3=serious, 4=severe

3. (b) HAZARDS – TOXICITY

Effects, Acute Exposure

Skin Contact	stinging, redness & swelling after 5 minute delay., corrosive damage in 24 hr; healing very slow and permanent scarring may occur
Skin Absorption	probably not absorbed; no toxic effects likely by this route
Eye Contact	corrosive; may damage the eyes permanently
Inhalation	highly irritating; may cause pulmonary oedema with difficult breathing & shortness of breath
Ingestion	corrosive damage to mouth and throat; stomach damage may also occur, vomiting & pain too

Effects, Chronic Exposure

General	prolonged exposure of skin unlikely because of severe acute effects; chronic absorption of small amounts may damage kidneys
Sensitising	not a sensitiser in humans or animals
Carcinogen/Tumorigen	not considered a tumorigen or a carcinogen in humans or animals
Reproductive Effect	no known effect in humans or animals
Mutagen	no known effect on humans or animals
Synergistic With	not known
LD ₅₀ (oral)	1100 & 1830mg/kg (rat), 700 & 1075mg/kg (mouse), 400mg/kg (dog)
LD ₅₀ (skin)	not known
LC ₅₀ (inhalation)	2000 & 8000ppm (rat), 825 & 3300ppm (mouse)

NOTE: Toxicity values vary widely both within and between species, and are not a reliable indicator of human toxicity.

Please ensure that this MSDS is given to, and explained to people using this product.

4. FIRST AID

- SKIN: Wash with plenty of water. Remove contaminated clothing and do not reuse until thoroughly laundered.
 EYES: Wash eyes with plenty of water, holding eyelids open. Seek medical assistance promptly if there is irritation.
 INHALATION: Remove from contaminated area promptly. **CAUTION: Rescuer must not endanger himself!** If breathing stops, administer artificial respiration and seek medical aid promptly.
 INGESTION: Give plenty of water to dilute product. Do not induce vomiting (NOTE below). Keep victim quiet. If vomiting occurs, lower victim's head below hips to prevent inhalation of vomited material. Seek medical help promptly.

Inadvertent inhalation of vomited material may seriously damage the lungs. The danger of this is greater than the risk of poisoning through absorption of this relatively low-toxicity substance. The stomach should only be emptied under medical supervision, and after the installation of an airway to protect the lungs.

5. PHYSICAL PROPERTIES

Odour & Appearance	clear, colourless, fuming, hygroscopic liquid with intense, pungent odour
Odour Threshold	11-20ppm
Vapour Pressure	33.5mmHg / 4.5kPa (20°C / 68°F)
Evaporation Rate (<i>Butyl Acetate = 1</i>)	2.1
Vapour Density (air = 1)	1.6
Boiling Range	101°C / 213°F
Freezing Point	8.4°C / 47°F
Specific Gravity	1.220 (20/20°C)
Water Solubility	complete
Also soluble in	complete in acetone, ethanol, methanol, glycerol, ethyl acetate, diethyl ether
Viscosity	1.8 centipoise (20°C / 68°F)
pH	2.4 (0.1 molar solution)
Conversion Factor	1ppm = 1.88g/m ³
Molecular Weight	46grams per mole

6. FLAMMABILITY & FIRE FIGHTING

Flash Point	46°C / 115°F (closed cup)
Autoignition Temperature	480°C / 896°F
Flammable Limits	12% – 38%
Combustion Products	carbon monoxide @ 150°C, nitrogen oxides, smoke, formaldehyde forms at 300-400°C
Fire Fighting Precautions	foam, dry chemical, water fog, water spray; fire fighters must wear SCBA
Static Charge Accumulation	cannot accumulate a static charge on agitation or pumping

7. STABILITY / REACTIVITY

Dangerously Reactive With	strong oxidising agents, strong alkalis, sulphuric acid, phosphorous pentoxide, furfuryl alcohol, sodium hypochlorite
Also Reactive With	powdered aluminium and other finely ground metals; corrosive to steel, iron, aluminium, lead
Stability	will not polymerise; stable over the short term but decomposes gradually
Decomposes in Presence of	palladium, nickel – to form hydrogen
Decomposition Products	carbon monoxide, hydrogen, formaldehyde – (depending on conditions)
Sensitive to Mechanical Impact	no

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8. PROTECTIVE EQUIPMENT / EXPOSURE CONTROL

ACGIH TLV	5ppm / 9.4mg/m ³
OSHA PEL	not listed
STEL (ACGIH)	10ppm / 19mg/m ³
Ventilation	mechanical ventilation may be required to maintain airborne titre below TWAEV; depending on handling procedures, an "escape" respirator (organic vapour & acid gas) must be available for every worker in the area in case of release – <i>store respirators in airtight containers (such as "Tupperware") to maintain "freshness"</i>
Hands	butyl or neoprene gloves recommended – <i>other types may also protect; consult supplier to confirm suitability</i>
Eyes	goggles and a face shield should be worn
Clothing	wear impermeable (above) apron, boots, & long sleeves if there is any danger of splashing

9. HANDLING & STORAGE

Store in a cool, dry environment, away from sources of ignition, heat and oxidising agents. Always ensure that containers, whether empty or full, or part full, are tightly sealed unless in use. *Note that 100% formic acid tends to decompose gradually to carbon monoxide and pressure may accumulate in the drum.* Product is more stable if diluted to 90-95%.

Avoid breathing product vapour. Use with adequate ventilation. If dealing with a spill, ventilate the area **and** wear a suitable respirator (see Part 8). If dealing with an extensive spill, use an air-supplied respirator.

Never cut, drill, weld or grind on or near this container. Avoid all contact with skin and wash work clothes frequently. An eye bath and safety shower must be available near the workplace.

When diluting, always add acid to water, and stir continuously to prevent layering.

10. SPILL PROCEDURES

Leak Precaution	dyke to control spillage and prevent environmental contamination
Handling Spill	ventilate contaminated area; recover free liquid with suitable pumps; absorb residue on an inert sorbent, sweep & pick up using plastic shovel, & store in closed containers for recycling or disposal

11. DISPOSAL

Waste Disposal	do not flush to sewer , recycle if possible, may be incinerated in approved facility
Containers	Drums should be reused. Recondition and pressure test by a licensed reconditioner prior to re-use. Pails must be vented and thoroughly dried prior to crushing and recycling. IBCs (intermediate bulk containers): polyethylene bottle must be pressure tested & recertified at 30 months. Replace at 60 months (5yrs). Steel containers must be inspected, pressure tested & recertified every 5 years. <i>Never cut, drill, weld or grind on or near this container, even if empty</i>

12. ENVIRONMENTAL INFORMATION

Bioaccumulation	this product is readily metabolised (biological half-life 2.5hr) and cannot bioaccumulate
Biodegradation	this product degrades readily in the presence of oxygen; 35-40% degradation in 5-10 days
Abiotic Degradation	this product reacts with atmospheric hydroxyl radicals; its estimated half-life in air is 36 days; rain dissolves and "bring down" airborne formic acid, which is neutralised by soil
Mobility in soil, water	this product is water soluble and will move readily in soil and water
Aquatic Toxicity	
LC ₅₀ (Fish)	175mg/litre (lepmois macrochirus, 24hr), 46mg/litre (carassius auratus, 96hr), 122mg/litre (leuciscus idus, 48hr)
LC ₅₀ (Crustacea)	34mg/litre (daphnia magna, 48hr)
EC ₅₀ (Algae)	25mg/litre (scenedesmus subspicatus, 96hr)
EC ₅₀ (Bacteria)	47mg/litre (pseudomonas putida, 17hr)

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13. TRANSPORT REGULATIONS

Canada TDG	PIN	UN-1779
AND	Shipping Name	formic acid
U.S.A. 49 CFR	Class	8
	Packing Group	II
Marine Pollutant		not a marine pollutant

14. EMERGENCY INFORMATION

Canada	Call CANUTEC (collect)	(613) 996-6666
U.S.A.	Call CHEMTREC	(800) 424-9300

15. REGULATIONS

Canada DSL	on inventory
U.S.A. TSCA	on inventory
Europe EINECS	on inventory (EC# 200-579-1)

Immediately Dangerous to Life or Health: 30 ppm

OSHA Standards: Permissible Exposure Limit: Table Z-1 8-hr Time Weighted Avg: 5 ppm (9 mg/cu m).

NIOSH Recommendations: Recommended Exposure Limit: 10 Hr Time-Weighted Avg: 5 ppm (9 mg/cu m).

Threshold Limit Values: 8 hr Time Weighted Avg (TWA): 5 ppm; 15 min Short Term Exposure Limit (STEL): 10 ppm.

Atmospheric Standards: This action promulgates standards of performance for equipment leaks of Volatile Organic Compounds (VOC) in the Synthetic Organic Chemical Manufacturing Industry (SOCMI). The intended effect of these standards is to require all newly constructed, modified, and reconstructed SOCMI process units to use the best demonstrated system of continuous emission reduction for equipment leaks of VOC, considering costs, non air quality health and environmental impact and energy requirements. Formic acid is produced, as an intermediate or final product, by process units covered under this subpart.

State Drinking Water Guidelines: Florida 14,000 ug/L

Clean Water Act Requirements: Formic acid is designated as a hazardous substance under section 311(b)(2)(A) of the Federal Water Pollution Control Act and further regulated by the Clean Water Act Amendments of 1977 and 1978. These regulations apply to discharges of this substance. This designation includes any isomers and hydrates, as well as any solutions and mixtures containing this substance.

CERCLA Reportable Quantities: Persons in charge of vessels or facilities are required to notify the National Response Center (NRC) immediately, when there is a release of this designated hazardous substance, in an amount equal to or greater than its reportable quantity of 5000 lb or 2270 kg. The toll free number of the NRC is (800) 424-8802. The rule for determining when notification is required is stated in 40 CFR 302.4 (section IV. D.3.b).

RCRA Requirements: As stipulated in 40 CFR 261.33, when formic acid, as a commercial chemical product or manufacturing chemical intermediate or an off-specification commercial chemical product or a manufacturing chemical intermediate, becomes a waste, it must be managed according to Federal and/or State hazardous waste regulations. Also defined as a hazardous waste is any residue, contaminated soil, water, or other debris resulting from the cleanup of a spill, into water or on dry land, of this waste. Generators of small quantities of this waste may qualify for partial exclusion from hazardous waste regulations (40 CFR 261.5).

FDA Requirements: Formic acid is a food additive permitted for direct addition to food for human consumption as a synthetic flavoring substance and adjuvant in accordance with the following conditions: a) they are used in the minimum quantity required to produce their intended effect, and otherwise in accordance with all the principles of good manufacturing practice, and 2) they consist of one or more of the following, used alone or in combination with flavoring substances and adjuvants generally recognized as safe in food, prior-sanctioned for such use, or regulated by an appropriate section in this part. Formic acid may be safely used as a preservative in hay crop silage in an amount not to exceed 2.25 percent of the silage on a dry weight basis or 0.45 percent when direct-cut. The top foot of silage stored should not contain formic acid and silage should not be fed to livestock within 4 weeks of treatment. Indirect food substance additives affirmed as generally recognized as safe. (a) Formic acid (CH₂O₂, CAS Reg. No. 64-18-6) is also referred to as methanoic acid or hydrogen carboxylic acid. It occurs naturally in some insects and is contained in the free acid state in a number of plants. Formic acid is prepared by the reaction of sodium formate with sulfuric acid and is isolated by distillation. (b) Formic acid is used as a constituent of paper and paperboard used for food packaging. (c) The ingredient is used at levels not to exceed good manufacturing practice in accordance with §186.1(b)(1). (d) Prior sanctions for formic acid different from the uses established in this section do not exist or have been waived. Drug products containing certain active ingredients offered over-the-counter (OTC) for certain uses. A number of active ingredients have been present in OTC drug products for various uses, as described below. However, based on evidence currently available, there are inadequate data to establish general recognition of the safety and effectiveness of these ingredients for the specified uses: formic acid is included in pediculicide drug products.

16. PREPARATION INFORMATION

Prepared for Megaloid Laboratories by Peter Bursztyn, (705) 734-1577

File Name: **Formic Acid**

With data from RTECS, Haz. Substance Data Base, Cheminfo (CCOHS), IUCLID Datasheets (European Chem. Substance Info. System), & others, as available

Preparation Date: **December 2003** Revision Date: **July 2006, July 2009**

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